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REMARKS

In the Office Action, the Examiner rejected claims 1-19 under 35 U.S.C. §112, second paragraph; rejected claims 1-6, 8-15 and 17-19 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,381,042 issued to Lerner et al. in view of U.S. Patent No. 5,825,794 issued to Ogino et al.; and rejected claims 7 and 16 under 35 U.S.C. §103(a) as being unpatentable over the combination of Lerner et al. and Ogino et al. further in view of U.S. Patent No. 3,569,797 issued to Simmons.

By this Amendment, Applicants have cancelled claim 4 without prejudice; amended claims 1-3, 5-13 and 15-19 to more clearly define the present invention; have added new claims 20-44 to claim additional features of the present invention. Applicants submit that no new matter has been added by this Amendment. Claims 1-3 and 5-44 are now pending.

With respect to the rejection of claims 1-19 under 35 U.S.C. §112, second paragraph, Applicants have amended claims 1 and 2 to recite that the plurality of leads have a greater thermal resistance than the heat extraction element. Applicants submit that this Amendment should address the Examiner's concerns regarding the term "thermally resistive." Further, Applicants have amended the claims to replace the term "member(s)" with the term "element(s)" where appropriate. Applicants submit that claims 1-3 and 5-19 meet the requirements of 35 U.S.C. §112, second paragraph.

Applicants respectfully traverse the rejection of claims 1-6, 8-15 and 17-19 under 35 U.S.C. §103(a) as being unpatentable over Lerner et al. and Ogino et al.

With respect to independent claim 1, Ogino et al. discloses a semiconductor laser device including a laser diode chip 1 mounted on a silicon sub-mount 2 that incorporates a photodiode. The sub-mount is mounted on a leadframe 3 and is encapsulated by an encapsulant 5. Tabs 3a of leadframe 3 extend out opposite sides of encapsulant 5 to provide a means for an electronic placement apparatus to grip the device for insertion in a circuit board or the like. Lerner et al. appears to be cited for its disclosure of the mounting of a semiconductor device on element 222, which the Examiner considers to be a heat extraction member. The Examiner further cites Lerner et al. for the proposition of attaching wires to the device and leads 221a, encapsulating the device and leads, and cutting tie bars 221 to electrically isolate the leads. In

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reviewing the Lerner et al. patent, it is apparent that it pertains to a method of encapsulating an integrated circuit on a leadframe where a portion of the leadframe opposite that from which the integrated circuit is attached is in contact with a heat slug 400, which has an exposed surface 402 that is not covered by any of the encapsulant 600. Element 222 referenced by the Examiner is not part of the heat slug 400, but rather is referred to in Lerner et al. as the "die attach pad," which is really just a portion of the leadframe. Because the die attach pad 222 is not directly exposed to the ambient environment, but rather is completely encapsulated, it could not be said that the leads of the leadframe have a greater thermal resistance than the die attach pad 222. Thus, Applicants submit that die attach pad 222 could not reasonably be construed to be the recited heat extraction member. Further, claim 1 recites that some surfaces of the heat extraction element are left unencapsulated. To the extent that heat slug 400 may be considered to be a heat extraction element, Applicants note that heat slug 400 is not part of the leadframe, nor is the semiconductor radiation emitter directly bonded to the heat slug with one or more bonding materials. Instead, the integrated circuit is mounted to the die attach pad.

With respect to Ogino et al., this reference does not disclose the step of bonding at least one semiconductor radiation emitter directly to the heat extraction element with one or more bonding materials. Instead, a sub-mount 2 is disposed between the radiation emitter 1 and leadframe 3. Accordingly, the combination of Lerner et al. and Ogino et al. fails to teach or suggest every feature of independent claim 1 and, thus, claim 1 is allowable over these references.

With respect to independent claim 2, neither Lerner et al. nor Ogino et al. teaches or suggests a multi-leadframe assembly having a plurality of leadframes, each including a heat extraction element, a plurality of leads having greater thermal resistance than the heat extraction element, and a recessed optically reflective cup formed in the heat extraction element. Lerner et al. is related to integrated circuits in general and does not disclose a radiation emitter, let alone the need for placing the radiation emitter in an optically reflective cup. The Ogino et al. device pertains to a laser diode device whereby the laser diode 1 emits a narrow collimated beam of light from one of the side edges of the diode device as depicted

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by reference numeral 6 in Figs. 1 and 2. If a recessed cup were formed in the leadframe, this would destroy the ability of the laser device to emit a narrow collimated beam. Thus, in reviewing Lerner et al. and Ogino et al. not only do they not disclose placing a semiconductor radiation emitter in a recessed optically reflective cup, but they also would not be suggestive to a modification to include any such reflective cup.

Applicants note that in rejecting claims 7 and 16, the Examiner suggests that Simmons discloses a leadframe having a recess on which the device is mounted. However, the leadframe disclosed in Simmons does not include an optically reflective cup. In fact, the leadframe is inserted into a housing 11 made of a material having good heat transfer characteristics, such as zinc alloy or an aluminum alloy, which are not even transparent (see column 1, lines 68-70). Thus, this leadframe is not intended for an optical radiation emitter and there would be no reason to include an optically reflective cup in the leadframe of Simmons.

For the reasons discussed above, Applicants submit that independent claim 2 is allowable over the teachings of Lerner et al., Ogino et al., and Simmons whether considered separately or in combination.

Applicants respectfully submit that claims 3, 5, 6, and 8-19, which depend from independent claim 2, are allowable at least for the reasons stated above with respect to independent claim 2.

With respect to claim 10, Applicants submit that claim 10 is further allowable insofar as none of the references teaches or suggests a leadframe where the electrical leads are thinner than the heat extraction element measured in a direction substantially parallel to the optic axis of a recessed optically reflective cup in which a semiconductor radiation emitter is mounted.

Applicants respectfully traverse the rejection of claims 7 and 16 under 35 U.S.C. §103(a) as being unpatentable over Lerner et al., Ogino et al., and Simmons.

Claim 7 has been amended to depend from independent claim 1 and thus is considered to be allowable for at least those reasons stated above with respect to independent claim 1. Further, claim 7 recites the step of forming at least one recessed optically reflective cup in the heat extraction element and attaching the at least one semiconductor radiation emitter in the

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recessed optically reflective cup. Thus, claim 7 is allowable for at least the reasons stated above with respect to claim 2.

Applicants submit that Simmons fails to teach or suggest the deficiencies of Lerner et al. and Ogino et al. with respect to independent claim 1. Likewise, Simmons fails to teach or suggest the deficiencies in the teachings of Lerner et al. and Ogino et al. as applied to claim 2, from which claim 16 depends. Accordingly, claim 16 is allowable over Lerner et al., Ogino et al., and Simmons for at least those reasons stated above with respect to independent claim 2.

By this Amendment, Applicants have added new claims 20-44 to claim additional features of the present invention. Of the new claims, claims 20-32 depend from independent claim 2 and are thus allowable for at least those reasons stated above with respect to independent claim 2.

New claim 22 is allowable for the additional reason that it recites that the at least one semiconductor radiation emitter is mounted on a first surface of a heat extraction element that is opposite an unencapsulated second surface of the heat extraction element that is exposed at least within an area directly opposite an area of the first surface where the at least one semiconductor radiation emitter is mounted. None of the cited references teaches or suggests such a feature.

With respect to new claim 25, it is noted that none of the cited references teach or suggest the step of forming a lens integral with the substantially transparent material. Thus, claim 25 is allowable for at least this additional reason.

Of the new claims, claims 33-41 depend from independent claim 1, and are thus allowable for at least the reasons stated above with respect to independent claim 1.

Claim 34 is allowable for the additional reason that it recites the features recited in claim 22 discussed above. Thus, claim 34 is allowable for at least those reasons stated above with respect to claim 22.

Claim 40 is allowable for at least the additional reason that none of the references teaches or suggests that the surface area of the heat extraction element that is encapsulated by

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the substantially transparent material constitutes 65 percent or less of the surface area of the heat extraction element.

Claim 41 is allowable for the additional reason that none of the references teaches that a heat extraction element having a bottom surface that lies on a plane below the bottommost surface of the electrical leads and wherein the substantially transparent material does not extend below the plane of the bottom surface of the heat extraction element.

New independent claim 42 is allowable over the prior art of record. Specifically, none of the references of record teaches or suggests the steps of mounting at least one semiconductor radiation emitter on a first surface of the heat extraction element and encapsulating the at least one semiconductor radiation emitter with an encapsulant material where the encapsulant material covers a portion of the first surface of said heat extraction element, while leaving exposed at least a portion of a second surface of the heat extraction element that is opposite the first surface, the exposed portion of the second surface being directly opposite an area of the first surface where the semiconductor radiation emitter is mounted.

New independent claim 43 is allowable over the prior art of record. Specifically, none of the references teaches or suggests the step of forming a leadframe assembly having a heat extraction element and a plurality of leads having greater thermal resistance than the heat extraction element, where the heat extraction element has a thickness in a direction that is substantially parallel to the direction in which radiation is emitted from the semiconductor radiation emitter package that is greater than the thickness of the electrical leads. New claim 44 depends from claim 43 and is allowable for at least for those reasons stated above with respect to independent claim 43.

In view of the foregoing amendments and remarks, Applicants submit that the present invention as defined by the pending claims is allowable over the prior art of record. The

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Examiner's reconsideration and timely allowance of the claims is requested. A Notice of Allowance is therefore respectfully solicited.

Respectfully submitted by,

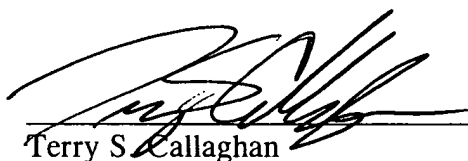
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